

Vansoniella chirindensis gen. n., sp. n. – an unusual taxon with translucent wings from Zimbabwe (Lepidoptera, Limacodidae)

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Abstract

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The genus *Vansoniella* gen. n. is established to accommodate the species *V. chirindensis* sp. n., collected in Zimbabwe by Van Son in 1937. The new species differs externally from other African taxa by translucent fore- and hindwings in the male sex. The wing venation is highly derived and the male genitalia are also structurally different from other genera. The genus occupies an isolated position within the family.

Key Words

Afrotropical Region

Limacodidae

taxonomy

wing dimorphism

southern Africa

Zimbabwe

Introduction

Over the years, the curator of the Lepidoptera collection of the Ditsong Museum of Natural History of South Africa, Pretoria (TMSA), M. Krüger, has set aside some strange moth specimens that could not readily be assigned to any of the South African families. The present specimen resembled some smaller species of Cossidae (e.g. *Stygiodes* Bruand, 1853) and was brought to my attention by M. Krüger. After dissections of the male genitalia, the individuals turned out to belong to the family Limacodidae. The family is currently divided into two subfamilies, Limacodinae and Chrysopolominae (De Prins and De Prins 2018). The latter was originally established as a family of its own, a view which is upheld by Kurshakov and Zolotuhin (2013, 2016) who provide a number of strong arguments. A molecular analysis of the family is not available to date leaving the rank of the two groups unresolved.

The examined specimen belongs to Limacodinae and was remarkable by its sparse scaling of the wings which gave them a translucent appearance. This character is not known to occur in any of the described genera of Limacodidae from Africa. In an attempt to find and identify related species, the Neotropical, Oriental and Australian parts of the rich Limacodidae collection of the Museum für Naturkunde, Berlin, were searched for similar species exhibiting translucent wings. Also, monographic treatments of the family were consulted (e.g. Viette 1980, Holloway 1986). Indeed, a number of species with this unusual character were found. A closer examination and comparison of antennae, wing venation and genitalia revealed these species to differ clearly from the African individual. The external resemblance did not indicate a relationship, and instead resulted from an independent, analogous development. The several specialized traits observed in the African species seemed not to be shared with any other genera.

The first species of Limacodidae described from Africa south of the Sahara was *Bombyx cloeckneria* Stoll, 1781. The species was collected from the Cape of Good Hope (Stoll 1781) and is now placed in *Caffricola* Hampson, 1919. Today, the Afrotropical Region is known to contain a very rich and diverse fauna of Limacodidae with many endemic genera. Heppner (1991) has reported 275 described species from south of the Sahara, but since then new descriptions (Krüger 2004; Mey 2011; Kurshakov and Zolotuhin 2013, 2016; Basquin 2016) have shifted the number to over 300.

The African fauna of Limacodidae was comprehensively treated by Hering (1928), who later added an identification key to the genera (Hering 1955). The South African species were revised by Janse (1964). He established 21 new genera and provided a dichotomous key to the African genera too. Though the latter is incomplete by omitting about a dozen genera from the tropical zone of the continent, it includes nearly all South African taxa and, thus, is of great help in the determination of species at least from this part of Africa. However, both keys did not work in the determination of the present species. The taxon is obviously not included in the keys. This result is not necessarily evidence for an unnamed taxon. Sexual dimorphism of the wings is a frequent feature of adult moths and occurs in many Lepidoptera families. In the past, males and females were often described as separate species until recognized as being the same taxon. Wing dimorphism seems to be an exceptional case in Limacodidae (Solovyev 2014). Neither Hering (1955) nor Janse (1964) mentioned or illustrated a single dimorphic species. However, it cannot be ruled out, that the male specimen has a dimorphic female, which was perhaps already described.

Translucent wings have evolved independently in species of different families, e.g. Cossidae, Metarbelidae, Sesiidae, Megalopygidae, Sphingidae. In Cossidae, Megalopygidae and also in Limacodidae this character is mostly restricted to the male sex, while the females exhibit the usual, dense scaling on the wings. The wing venation, however, does not need to be affected by this dimorphism and appears to be largely the same in both sexes. Some dimorphic species with both sexes available in the collection were examined for this feature. A corresponding venation was observed in the following species:

- Doratifera oxleyi* (Newman, 1855) (Australia) – Limacodidae
- Phobetron pitheciun* (J.E. Smith, 1797) (USA) – Limacodidae
- Laphridia francesca* (Swinhoe, 1902) (Java) – Limacodidae
- Podalia bolivari* (Heylaerts, 1884) (Colombia) – Megalopygidae.
- Stygioides colchicus* (Herrich-Schäffer, 1851) (Turkey) – Cossidae

In contrast, the wing venation of both the fore- and hindwings differs between sexes in the strongly dimor-

phic *Eulophonotus myrmleon* Felder, 1874 (South Africa) – Cossidae.

The differences are due to a reduction of veins in the male, whereas the female has retained the conventional vein configuration (Mey 2016).

There are three genera in the review of Janse (1964), which are known only from females. A closer inspection of the wing venation and number of tibial spurs provided the following results: The wing venation does not correspond with the venation of the species in question. The species of *Prolatoia* Holland, 1893 and *Zorostola* Janse, 1964 have two pairs of spurs on the hind tibia. *Zoradella* Jordan, 1924 has only the terminal spur pair like the unknown species but the venation is very apomorphic with stalked cubital veins Cu_{1a+b} in the forewings and a very short fork of RR+M₁ in the hindwings. This is not a conservative venational pattern, but a highly derived character that can be expected to occur in the male too, according to the observations of other cases of dimorphic species.

The three genera can be excluded as representing the potential female. In conclusion, none of the described genera are suited to accommodate the species with the translucent wings. Since this character as well as the unique genitalia is considerably broadening the morphological diversity of Limacodidae, the establishment of a new genus seems to be justified, even with only a single specimen at hand. It seems to be a rare species, and we cannot expect fresh material to become available in the near future.

Material and methods

Dissection of genitalia was performed according to the procedure described in Robinson (1976). The genitalia were embedded in Euparal. Chlorazol Black was used for staining. Prior to embedding the cleared genitalia on microscope slide, they were drawn using a camera lucida attached to a Leica MZ12 compound microscope. Photographic documentation of the imago and genitalia was done with a Leica Z 16 APOA Microscope in combination with a Leica DFC490 camera and Leica Application Suite programme, version 4.5.0 on a Windows PC.

Holotype label data are quoted verbatim: quotation marks ("") signify data on a single label, a forward slash (/) indicates the end of a line of print. Supplementary or qualifying information is provided in square parentheses.

The terminology used in the description of the species follows Janse (1964) with the exception of aedoeagus, which is replaced by phallus.

Taxonomic account

Vansonella gen. n.

<http://zoobank.org/05CAAB8A-F861-4501-9BC9-C6A0C2B6BD98>

Type species. *V. chirindensis* sp. n.

Gender. feminine.

Systematic position. Limacodidae, Limacodinae.

Etymology. The genus name was chosen to the memory of George van Son (1898–1967), former curator of Lepidoptera at the Transvaal Museum in Pretoria and collector of the type species.

Description. see description of *V. chirindensis* sp. n.

Diagnosis. Small species with translucent wings resulting from sparse scaling and minute scales in upright position. Antenna bipectinate towards tip; epiphysis absent, spurs 0.2.2.; forewing with R₃₊₄₊₅ on common stalk, areole absent; hindwing with RR+M₁ as long fork, M_{3+Cu1a} shortly stalked. Male genitalia beak-like uncus and hook-like gnathos; vinculum slender, long saccus present; valva triangular, with rounded hump on median side close to vinculum; juxta with pair of long, digitate processes and basal apophyses; apex of phallus with curved thorn and short, subapical spine.

Vansonella chirindensis sp. n.

<http://zoobank.org/4F04E05C-E89A-4696-9C16-A0BB4A09D860>

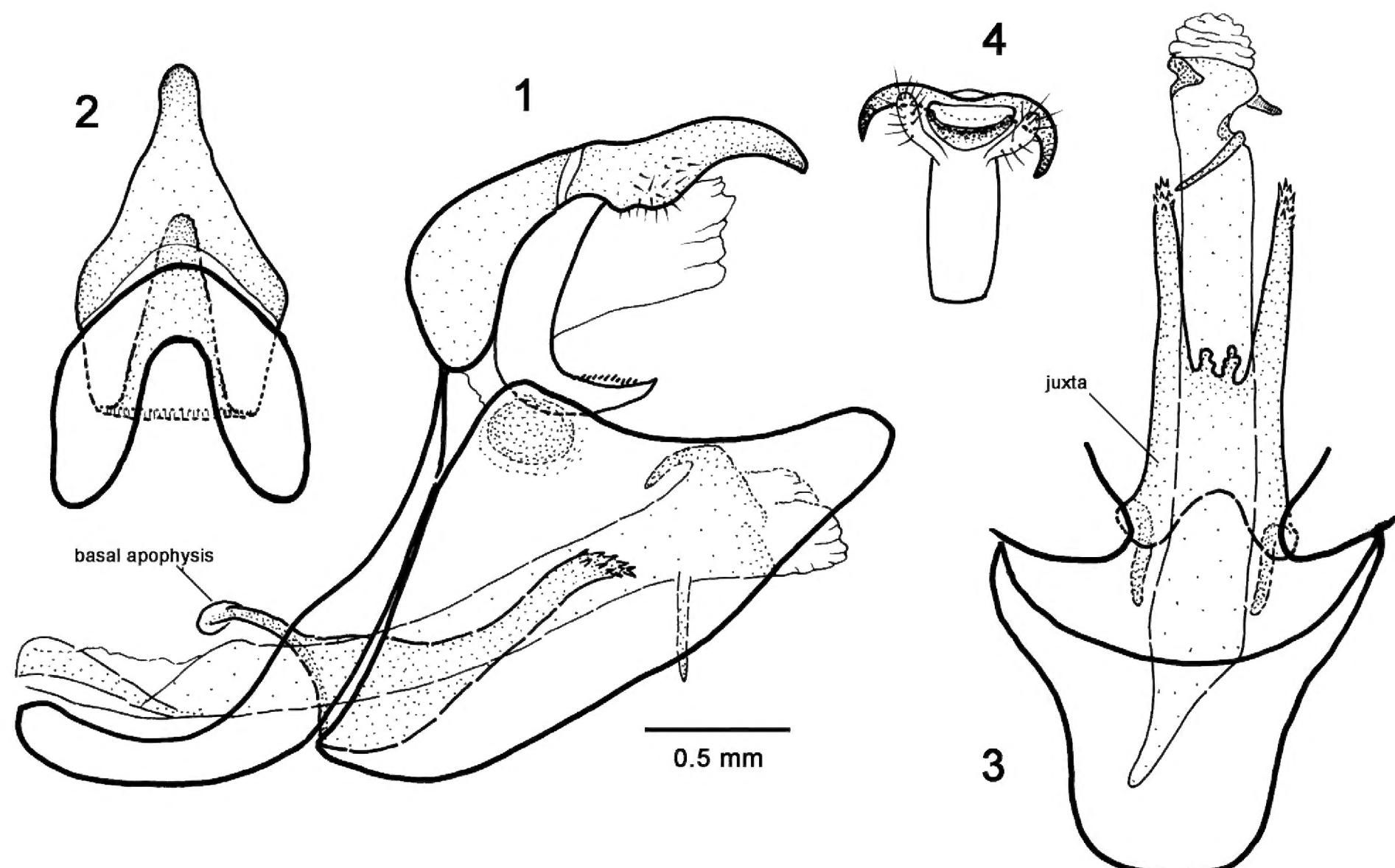
Material examined. Holotype ♂, [Zimbabwe], “Chirinda For-/est, S. Rhod. XII/ -1937 G. van Son” [printed on white card], [20°24'S 32°41'E], genitalia slide Mey 85/17 (deposited in TMSA)

Etymology. The specific epithet is derived from the collecting site of the holotype, Chirinda on Mount Selinda.

Description. Adult male (Figs 7, 8): Length of forewing 7 mm, wing span 16 mm. Vertex of head with tuft of dark brown, shining, piliform scales projecting front-

tad between scapes; frons with appressed, downwardly directed, yellow scales; ocelli and chaetosemae absent; labial palpi short, porrect, with terminal segment not protruding beyond frontal scaling; scape and pedicellus short; antenna yellow-brown, bipectinate from base to tip, 52 pairs of rami, sparsely scaled dorsally and with numerous, short cilia on ventral sides. Thorax and tegulae dorsally with long, dark brown, shining scales; tibia of forelegs shorter than femur, epiphysis absent, tarsal segments of all legs without ventral spines, metatarsus with broad arolium and short pulvilli (Fig. 4), dorsal side of all legs with tufts of long scales, spurs 0.2.2.; forewings densely scaled on veins and in costal and anal fields, wing membrane with small, broad, short scales in upright position and widely spaced, multi-dentate at apex; scales on hindwing membrane smaller and mostly bi-dentate at apex; scales usually brown but yellow on bases of cubital and medial veins; fringes orange-brown with metallic shine. Forewing venation (Fig. 6) without areole, R₂₊₃₊₄₊₅ stalked from upper corner of cell, A₁₊₂ without distinct basal loop; hindwing with frenular bristle, R+M₁ and M_{3+Cu1a} shortly stalked, anal field densely covered by long, dark brown scales. Abdomen dark brown, tergum VIII with short, quadrangular plate on apical margin.

Male genitalia (Figs 1–3, 5): Tegumen and vinculum largely separate structures, interconnected in one point; lateral arms of vinculum slender, saccus large and broad; tegumen dorsally excised, separated from beak-like uncus by a small, membranous band; gnathos hook-like, preapical dorsal margin with minute den-



Figures 1–4. *Vansonella chirindensis* sp. n., male genitalia, 1. lateral, 2. dorsal, 3. ventral, 4. ventral view of pretarsus

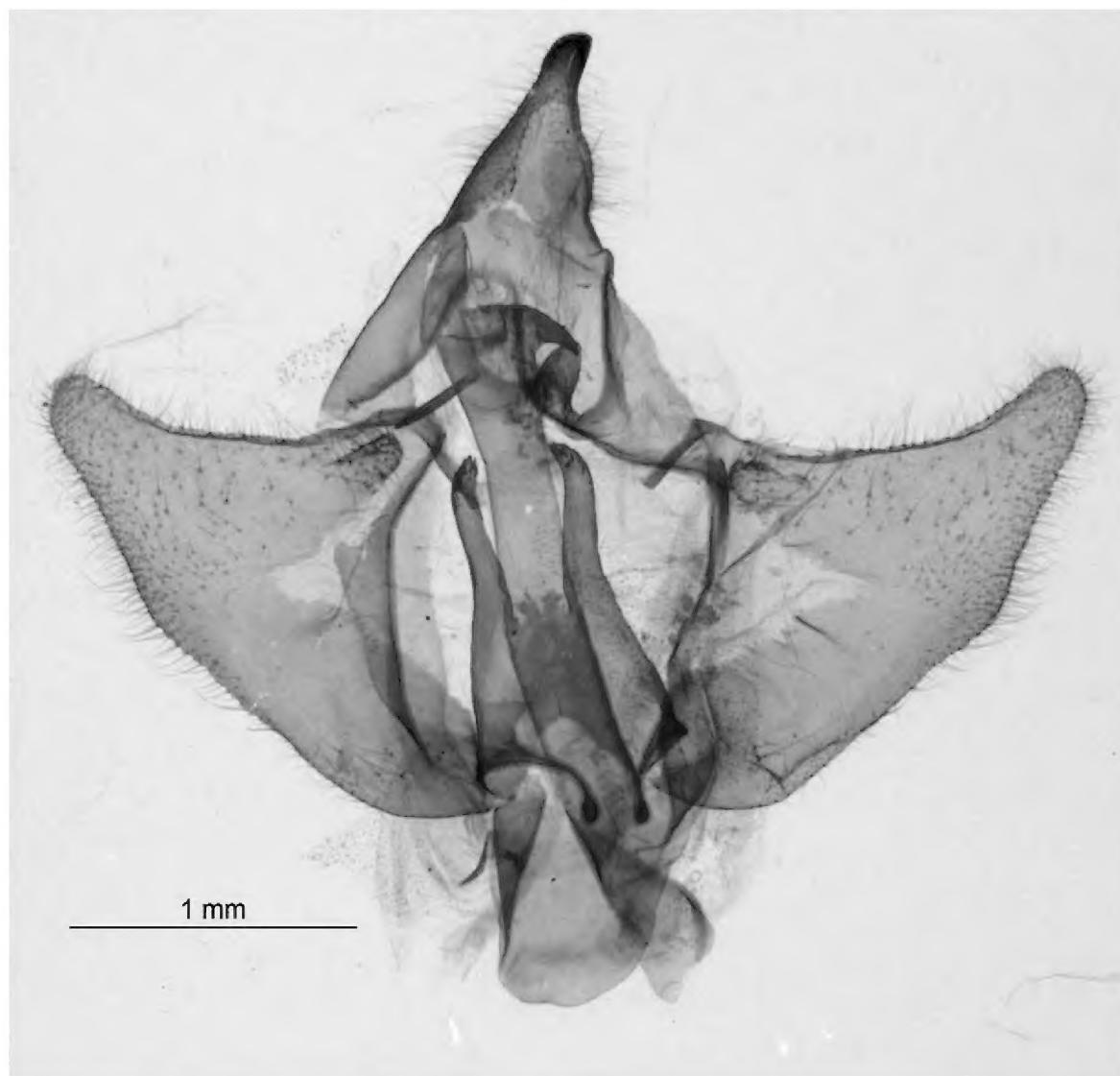


Figure 5. *Vansoniella chirindensis* sp. n., male genitalia slide Mey 85/17, caudal view

ticles; valva triangular, apex rounded, costal margin concave, inner side with a rounded hump on the basal dorsal corner close to vinculum; juxta large, covering the ventral and lateral sides of the phallus base and produced apically into a pair of finger-like processes bearing small dents on the tips, base of juxta with long and slightly curved apophyses, reaching into segment VIII; phallus tubular, longer than valva, apex with curved, dorsal process and short, subapical spine, directed ventrad; vesica without cornuti.

Female: unknown.

Distribution. The new species is known from the type locality only. The Chirinda Forest is an isolated patch of mountain forest on Mt. Selinda from about 1000 m to 1250 m elevation in East Zimbabwe (Fig. 9). The species may occur also in the Chimanimani Mts. north of the Chirinda Forest.

Remarks. Janse (1964) was not able to examine himself all species known at that time. But he included the information provided by other authors in his revisionary work (e.g. West 1937). In addition, after 1964 a number of further species of Limacodidae was described from Africa (Carcasson 1965, Pinhey 1968, Rougeot 1977, Viette 1980). They are fully scaled and not related to *Vansoniella* gen. n., with the exception of males of *Latoia pumilus* (Hering, 1957) and *L. heringi* (Vitte, 1965) from Madagascar which exhibit some resemblance by the presence of hyaline patches on the forewings, but other characters as antennal structure and wing venation indicate that this resemblance is due to convergence.

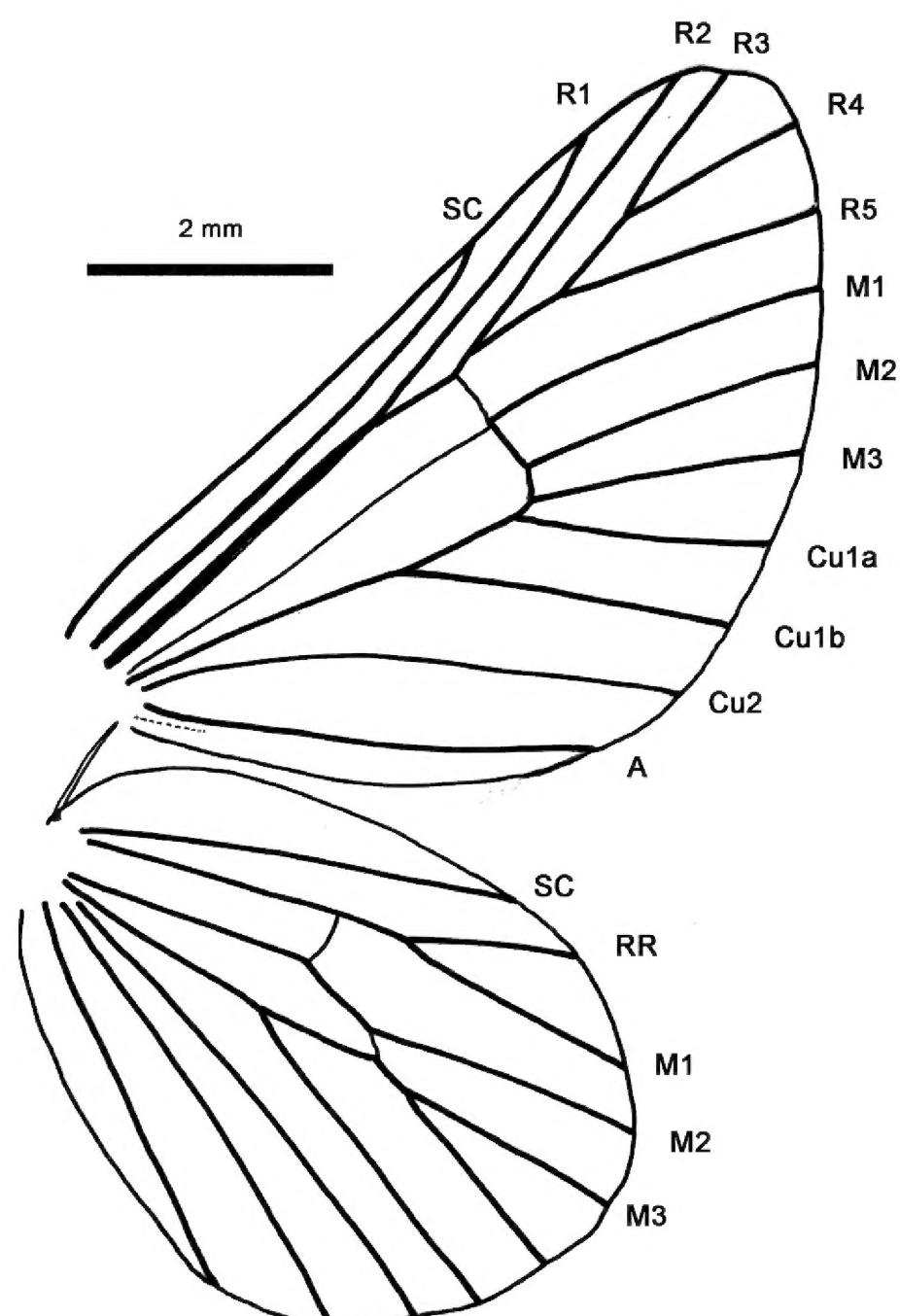
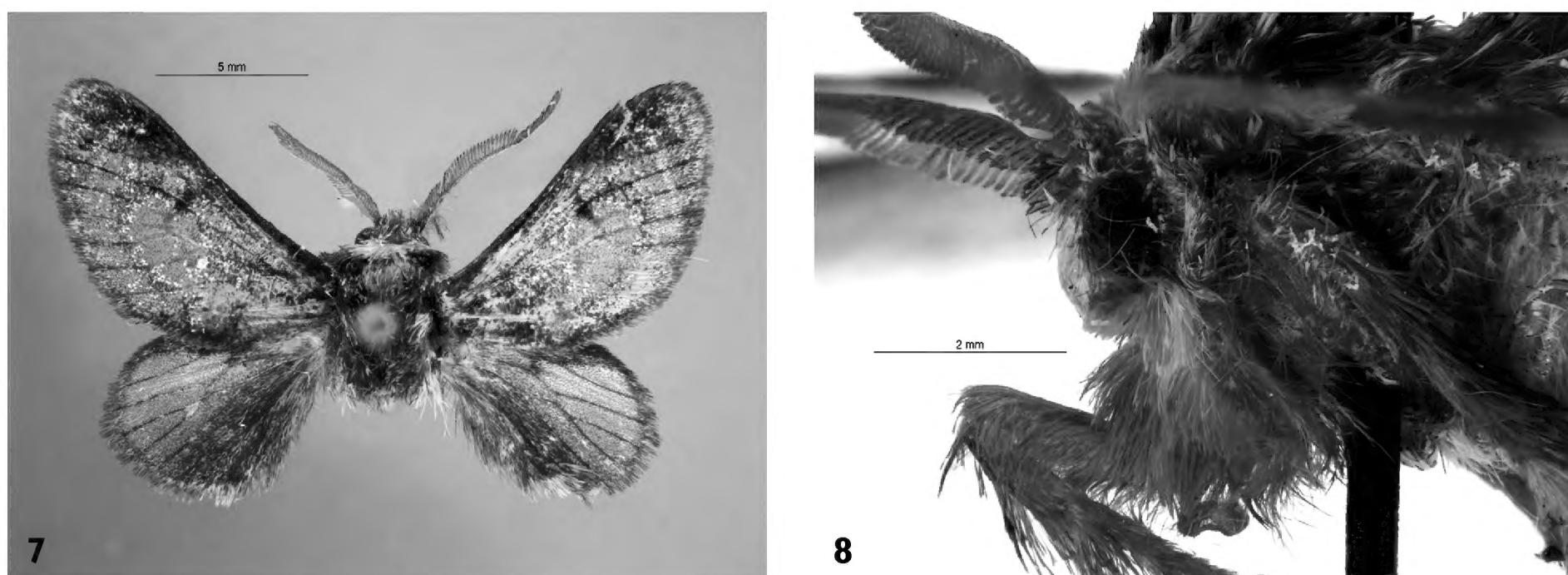


Figure 6. *Vansoniella chirindensis* sp. n., male wing venation



Figures 7–8. *Vansonella chirindensis* sp. n., male holotype, **7.** dorsal view, **8.** lateral view of head and labial palpi.



Figure 9. Map of southern Africa showing the type locality of *V. chirindensis* sp. n. in Zimbabwe (20°24'S 32°41'E).

Discussion

The forewing venation of the new genus is similar to *Afrobirthama* Hering, 1955, with R₂₊₃₊₄₊₅ on a short stalk and the evenly spaced M veins at their bases. Also, the long fork of RR+M₁ in the hindwings is like in *Afrobirthama*. The basally fused M₃ and Cu_{1a} is a remarkable character of *Vansonella* gen. n. and does not occur in the former genus. Also, the genitalia, the antenna and the spur formula are quite different.

The terminal structures of the phallus are not shared by any of the African genera. The digital processes of the juxta of *Vansonella* gen. n. are also present in *Jordaniana* Hering, 1955 and *Macroplecta* Hampson, 1892. The latter genus even bears the basal apophyses of the juxta, but other genital and external characters are completely different.

The few genera of Limacodidae with transparent wings in the Oriental- and Australasian Region can be distinguished externally by wing venation and antennal

structure. Their genitalia are also quite distinct. The genera do not form a monophyletic entity. In consequence, transparency of wings is to be considered a character which can originate in different evolutionary lines and at different times. It is, thus, of minor value in searching for the sistergroup of *Vansonella* gen. n., which could comprise species with fully scaled wings. At present time, *Vansonella* gen. n. is regarded as a derived genus with an isolated position within Limacodidae.

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